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BOOK REVIEWS

Light Reaction Path of Photosynthesis: edited by F. K. FONG. Springer, Berlin, 1982. xi + 342 pp. DM 138, approx $US 65.

The preface to this book states that it "deals with the light reaction pathway in photosynthesis. The photophysicochemical events are presented in the order of their occurrence, beginning with the collection of sunlight by antenna systems, ending with the reduction of CO_2 to carbohydrates. Relationships between the structural properties and kinetic effects of primary and secondary events spanning time domains in the range 10^{-12}–1 sec are explored. Photosynthesis is examined in terms of "a light-induced redistribution of reaction intermediates common to the biosynthesis and metabolic degradation of carbohydrates". This is, in fact, quite misleading. The bulk of the book consists of quite adequate treatment of early events in light harvesting and energy conversion as follows: Phycobiliproteins: Molecular Aspects of a Photosynthetic Antenna System (H. Scheer); Structure and Excitation Dynamics of Light-Harvesting Protein Complexes (G. S. Beddard and R. J. Cogdell); Photooxidation of the Reaction Centre Chlorophylls and Structural Properties of Photosynthetic Reaction Centers (A. J. Hoff); Triplet State and Chlorophylls (H. Levanon and J. R. Norris); The Chlorophyll Triplet State and the Structure of Chlorophyll Aggregates (R. H. Clarke); and Synthetic Approaches to Photoreaction Centre Structure and Function (M. R. Wasielewski). In general these are well presented and illustrated, critical, reviews of the subjects as they stood at the time the manuscripts were written. However, most references are pre-1980 (although in some chapters 'notes added in proof' are used to update both ideas and references). This would indicate some delay between writing and publication.

Apart from these aspects of primary events, the rest of photosynthesis is dealt with in the last chapter written by the editor, F. K. Fong. The greater proportion of this chapter again considers early events related to chlorophyll, plus some reports of experiments carried out *in vitro* using the heavy isotope of oxygen to look at water splitting and carbon reduction by hydrogen generated using a platinum–chlorophyll electrode system. This leads to the suggestion "The results described above suggest the capability of a single chlorophyll photosystem to catalyze water splitting and CO_2 reduction"; and the statement is given prominence on both the book jacket and publicity literature that "Of particular interest is the finding that carbon reduction in photosynthesis is an integral part of the chlorophyll light reaction". Aspects such as electron transport, photophosphorylation, the role of NADPH, etc are not discussed. Carbon fixation itself is considered in two short sections where material produced by Calvin in the early 1950's is quoted, although the exact point being made is obscure. Terminology is also out of date, the author using diphosphate rather than the now accepted bis-phosphate. In general the impression is of someone who has, I am sure, an adequate background in physical chemistry, but is getting into areas of biology with which he has less experience.

This is a book for those actively engaged in research in the area of primary photochemical events in photosynthesis, although in view of the delay in publication its value is diminished. For those entering the field or wishing to expand their knowledge I would suggest that they do not take the claim (made on the cover) that it contains the "latest interpretations of the two-light-reaction scheme of photosynthesis" too seriously.

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Physiology and Biochemistry of Seeds in Relation to Germination: by J. B. BEWLEY and M. BLACK. Vol. II, Springer, Berlin 1982. 72 tables, 153 figs, xi + 375 pp. DM 128.

This volume maintains the high standards, the comprehensiveness, the meticulousness and the in-depth treatment of germination set by the first volume. It is organized in six chapters dealing respectively with viability and longevity, dormancy, release from dormancy, control of dormancy, perspective on dormancy, and environmental control of dormancy. Inevitably this structure causes a certain amount of overlap between the different chapters. For example the separation between dormancy and release from dormancy is a bit confusing, and the differentiation between mechanisms causing release from dormancy and the environmental control of germination is not always justified or useful. Some topics already referred to in Vol. I, e.g. gibberellin action or membrane behaviour, are also treated here. The organisation also made it necessary to refer extensively to hormones in both volumes. Since 4 years have elapsed since the appearance of Vol. I there is some advantage in this and it permits the authors to update the information previously brought. The book is profusely illustrated with diagrams and tables. However the two nomograms relating viability, moisture, etc. do not really add very much to understanding the problem of viability and some figures, e.g. Figs 2.22 and 4.2 or Tables 1.3 or 2.6 do not seem to be all that instructive. These points are mentioned only because they surely add to the cost of production. Some of the graphs require very careful and prolonged study and figure legends are sometimes very long and intricate and require considerable concentration on the part of the reader. Most of the discussions are extremely detailed and provide additional new insight into some of

the problems of germination, e.g. the chapter on control of dormancy. However the chapter on perspective of dormancy does disappoint in this respect. A number of minor blemishes can be noted. Auxin is not mentioned, either in relation to ethylene or in relation to its metabolism. It is also claimed that isocitric lyase is absent from lettuce seed but there is convincing evidence to the contrary. In a volume of such breadth and coverage such minor slips are almost inevitable, and in no way detract from its value. The volume contains a wealth of information most of which is extremely difficult to get at elsewhere. It is well indexed with separate species, author and general indices, well up-to-date, with literature covered more or less to 1980, although I have the impression that it was rather longer in coming out than the authors would have wished. This is not a text for undergraduates but I recommend this volume warmly to all those interested in the topic of seeds and as a must for all researchers in the field. There are not too many books around in this area and this is certainly a very good one. The price is hardly cheap, but considering the increased number of pages, and 4 years of inflation, the increase in price is reasonable (cf. to Vol. I).

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Cyanide in Biology: edited by B. VENNESLAND, E. E. CONN, C. J. KNOWLES, J. WESTLEY and F. WISSING. Academic Press, London. 1981. 541 pp., £22.

This volume has grown from a workshop on 'HCN Metabolism' held in August 1978 at the University of Kent. The range of topics has been expanded to include authors not present at the meeting and, in addition, all authors have been encouraged to bring their material up to date as of June 1980. The volume includes 35 chapters contained within 541 pages of text and, although the editors apologise that some people may be disappointed in the choice of topics, it is obvious that they have attempted to make a comprehensive volume on *Cyanide in Biology*.

Early toxicological studies dating from the eighteenth century are reviewed in the opening chapter and they set the scene for the well known toxic effects of cyanide. In common with other toxic natural products, cyanide has also featured in medicine and even though it was removed from the 1948 edition of the *British Pharmacopoeia*, it still features as an expectorant in some plant based medicines. The pharmacology of cyanide and its role as an inhibitor of enzymes are reviewed in some detail.

Cyanogenesis, i.e. the ability of plants to produce hydrogen cyanide, is exhibited by approximately 2000 species of higher plants as well as by numerous microorganisms and some animals. Therefore it is particularly interesting to note the distribution of the various amino acid-derived cyanogenic glycosides and also lipids within various plant families and to read about the isolation procedures and methods utilized for their structure elucidation. A number of cyanide-containing plants, including cassava, yams, sorghum, millets, maize, apricots, peaches and almonds, are edible plants which form part of the diet of humans and/or other animals, thus they are potentially hazardous and may result in toxicities or even in death. Cassava is the major cyanide-containing food crop and it is disturbing to read that application of an enzymic assay to determine both free and bound cyanide has indicated that residual bound cyanide concentrations are higher in some foodstuffs than previous studies suggested.

The biosynthesis of cyanogenic glycosides from amino acids via *N*-hydroxylation and then to aldoxime, nitrile and hydroxynitrile is discussed in some detail. Apparently only one non-protein amino acid and five of the protein amino acids serve as direct precursors whereas other amino acids such as alanine and tryptophan do not have what it takes to become cyanogenic. The biosynthetic routes to cyanogenic glycosides, glucosinolates, hydroxamates and nitro compounds all share common intermediates and hence these four classes of secondary metabolites may be derived from a common pathway.

The metabolism of cyanide by bacteria is also reviewed and despite the considerable work which has been done in this area, there are still many questions which are left unanswered. Specific chapters deal with aspects of the role of cyanide in species of *Pseudomonas* and *Chromobacterium*, microalgae, fungal pathogens of cyanogenic plants, and arthropods. Nitrilase enzymes have been discovered comparatively recently in higher plants, fungi and bacteria and the proposal is made that a significant number of these enzymes still await discovery. Cyanide-resistant respiration in bacteria and in eukaryotic cells form the topics of two separate chapters.

The concluding chapters are concerned with the problem of cyanide contaminating fresh water, the genetic control of plant cyanogenesis and the role of hydrogen cyanide in prebiotic evolution. It is claimed that the origin of terrestrial life was very closely dependent on the synthetic capabilities of hydrogen cyanide and its derivatives. Whether or not this is the case is outside the terrestrial experience of this reviewer but what is most obvious from this volume is that cyanide, which has such a notorious reputation, has far more implications in biology than its ability to end life. I believe that the cyanide experts will want this book on their library shelves because of the detailed contents within the space of a single volume. However, the wide ranging approach to a narrow topic means that it contains a wealth of information which should be of interest to all scientists concerned with living organisms.

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